

CLAIMS:

1. An exhaust gas control apparatus for an internal combustion engine characterized by comprising:

an exhaust catalyst disposed in an exhaust passage (4) of the internal combustion engine;

a concentration detection unit (10) that is capable of detecting a total concentration of a sulfur oxide and a hydrogen sulfide contained in an exhaust gas that passes through the exhaust catalyst, and detecting a concentration of the sulfur oxide; and

a sulfur concentration estimation unit (15) that estimates a sulfur concentration of a fuel based on a detection value of the concentration detection unit (10) when it is determined that the exhaust gas is at one of a stoichiometric and rich air/fuel ratio.

2. The exhaust gas control apparatus according to claim 1, characterized by further comprising an air/fuel ratio control unit (15) that controls the air/fuel ratio of the exhaust gas into one of the stoichiometric state and the rich state.

3. The exhaust gas control apparatus according to claim 2, characterized in that the air/fuel ratio control unit (15) executes a rich spike control in which the air/fuel ratio of the exhaust gas is temporarily brought into the rich state at a predetermined cycle, and the air/fuel ratio control unit (15) comprises a rich amount increase unit that executes at least one of a control for holding the air/fuel ratio of the exhaust gas in the rich state for a longer time than a time under the rich spike control, and a control for bringing the air/fuel ratio of the exhaust gas into a richer state than a state under the rich spike control.

4. The exhaust gas control apparatus according to claim 2 or 3, characterized in that the exhaust catalyst comprises a NOx catalyst (8) of occlusion and reduction type, a NOx occluded amount estimation unit (15) is provided for estimating an amount of NOx that has been occluded in the NOx catalyst (8), and the air/fuel ratio control unit (15) controls the air/fuel ratio of the exhaust gas into one of the stoichiometric state and the rich state when the NOx occluded amount estimated by the NOx occluded amount estimation unit is determined to be equal to or larger than a predetermined amount.

5. The exhaust gas control apparatus according to any one of claims 1 to 4, characterized by comprising a catalytic temperature detection unit (15) that detects a temperature of the exhaust catalyst, characterized in that the sulfur concentration

estimation unit inhibits an estimation of the concentration of sulfur contained in the fuel when it is determined that the temperature detected by the catalytic temperature detection unit (15) is equal to or higher than a predetermined temperature.

5 6. An exhaust gas control method for an internal combustion engine, in which an exhaust catalyst is disposed in an exhaust passage (4) of the internal combustion engine, and a concentration detection unit (10) that is capable of detecting a total concentration of a sulfur oxide and a hydrogen sulfide contained in an exhaust gas that passes through the exhaust catalyst, and detecting a concentration of the sulfur oxide, the exhaust gas control method being characterized in that a sulfur
10 concentration of a fuel is estimated based on a detection value of the concentration detection unit (10) when it is determined that the exhaust gas is at one of a stoichiometric and rich air/fuel ratio.

 7. The exhaust gas control method according to claim 6, characterized in that the air/fuel ratio of the exhaust gas is controlled into one of the stoichiometric state
15 and the rich state.

 8. The exhaust gas control method according to claim 7, characterized in that a rich spike control in which the air/fuel ratio of the exhaust gas is temporarily brought into the rich state is executed at a predetermined cycle, and at least one of a control for holding the air/fuel ratio of the exhaust gas in the rich state for a longer
20 time than a time under the rich spike control, and a control for bringing the air/fuel ratio of the exhaust gas into a richer state than a state under the rich spike control is executed.

 9. The exhaust gas control method according to claim 7 or 8, characterized in that an amount of NOx that has been occluded in a NOx catalyst (8) provided as the exhaust catalyst is estimated, and the air/fuel ratio of the exhaust gas is controlled into
25 one of the stoichiometric state and the rich state when the estimated occluded amount of the NOx is determined to be equal to or larger than a predetermined amount.

 10. The exhaust gas control method according to any one of claims 6 to 9, characterized in that a temperature of the exhaust catalyst is detected, and an
30 estimation of the sulfur concentration of the fuel is inhibited when it is determined that the detected temperature is equal to or higher than a predetermined temperature.